Future Technology – Available Now

multi EA® 5000

Elemental Analysis

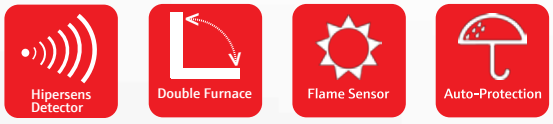
analytikjena
An Endress+Hauser Company

Systems from Analytik Jena - The Pacesetter in Elemental Analysis

The challenge modern analytical systems for elemental analysis face lies in reliable automation for an extensive range of samples. The multi EA® series by Analytik Jena combines automation and reliability in unmatched quality thanks to patented innovative solutions. It is a system created to cope with the most diverse sample matrices.

multi EA® 5000 – C, N, S, Cl in ONE analysis cycle

- Sensitive: HiPerSens® detection
- Unique: Double furnace technology
- Innovative: Flame sensor technique
- Safe: Auto-protection
- Intuitive: Self Check System
- Multi applicable: Multi-matrix autosampler



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In Future There Will Be an Elemental Analyzer Which Has Never Been Seen Before

The multi EA® 5000 is much more than just a further development of our many years of analytical experience. It represents a new generation of elemental analyzers. Analyzers that are setting standards!

We have been producing elemental analyzers for more than 50 years. A lot has changed since the early days. Yesterday's cumbersome analyzers have become more intelligent, safer, easier to use and more reliable. They also come with an ever-widening range of applications. Do elemental analyzers still have the ability to surprise? Of course! Once you find out more about the multi EA® 5000, you'll realize why we are so sure of it.

The multi EA® 5000 is versatile, reliable, easy to operate and capable of so much more than just elemental analysis. C, N, S and Cl from solid, liquid, paste-like and gaseous samples are only a small part of what it can do. TOC, EOX and AOX / TOX analyses are further applications easily covered by the multi EA® 5000. This makes it a universal talent to be used in various fields such as petrochemistry, environmental analysis, pharmacy, the chemical industry and materials testing.

Its unique modular principle means that the system can be constructed individually. You can configure your multi EA® 5000 to meet your needs and requirements, thus creating your personal analysis system. No problem if your analytical requirements change, the modular structure of the multi EA® 5000 can be extended at any time.

The globally unique **double furnace technology** makes it quick to switch between vertical and horizontal applications in one instrument, i.e. fast and optimum adaptation to the sample matrix and analysis standard with minimal effort.

The **flame sensor technology** guarantees matrix-optimized, quantitative combustion. Even unknown samples, whose properties are unidentified, can be analyzed soot-free, precisely and reliably today.

The **Self Check System (SCS)**, the intuitive multiWin® software management and the unique **FAST (Fast, Safe and Tight) connection technique** provide the user with easy operation and reliable readings.

Standards that you won't want to be without

- Multi-element, carbon, sulfur, chlorine and nitrogen determination in a single device
- Extended measuring range with low-maintenance, ultra-modern detectors ranging from ppb to the percentage range
- Multi-application, one analyzer for liquid, paste-like, solid, gaseous and LPG samples
- Multi-matrix autosampler for the fully automatic determination of solid and liquid samples in vertical or horizontal furnace configuration
- Modular design, freely selectable and extendable configuration of your analysis system
- Conformity with a multitude of common international and national standards such as ASTM, EPA, DIN, ISO, EN etc.
- Easy to use, preset standard methods simplify work and save valuable analysis time
- Optimum adaption to the sample matrix thanks to double furnace technology, vertical and horizontal operating mode in one and the same device
- Self Check System (SCS) for optimum operating safety
- Flame sensor technology for matrix-optimized sample decomposition

Highlights that you really should know about

- Flame sensor technology with self-learning function
- A multi-purpose combustion tube for all standard applications in the horizontal and vertical operationn mode guarantees the simplest possible operation
- Internal intelligence, systems which test and optimize the settings automatically
- Revolutionary FAST connection technique guarantees simple operation free of gas leaks
- Auto-protection, fully integrated particle filter to protect the whole analysis system increases operating safety and minimizes maintenance expenditure
- Multi-function autosampler systems with automatic detection of sampler head, syringes, tray sizes etc.
- Flow Management System (FMS) for stable instrument performance and accurate results

In Future, We Will Change Methods … Without Any Laborious Conversion

One minute S in diesel, next minute Cl in propylene gas – analyze all parameters of one sample without converting the analysis system.

The software and the extensive library of prefabricated method packages of the multi EA® 5000 will help you select an appropriate method and allow you to activate the right parameters easily. Using the multiWin® menu, you can permanently monitor all instrument functions and change settings individually, at any time.

The **double furnace**, with an incredibly easy-to-use tilting mechanism enables the system to be optimally adapted to your sample. For rapid and precise determination of liquids and gases, particularly in the trace range, the use of vertical systems has become standard. With the increase in complexity, volatility and viscosity of the samples, however, it is necessary to use the horizontal mode.

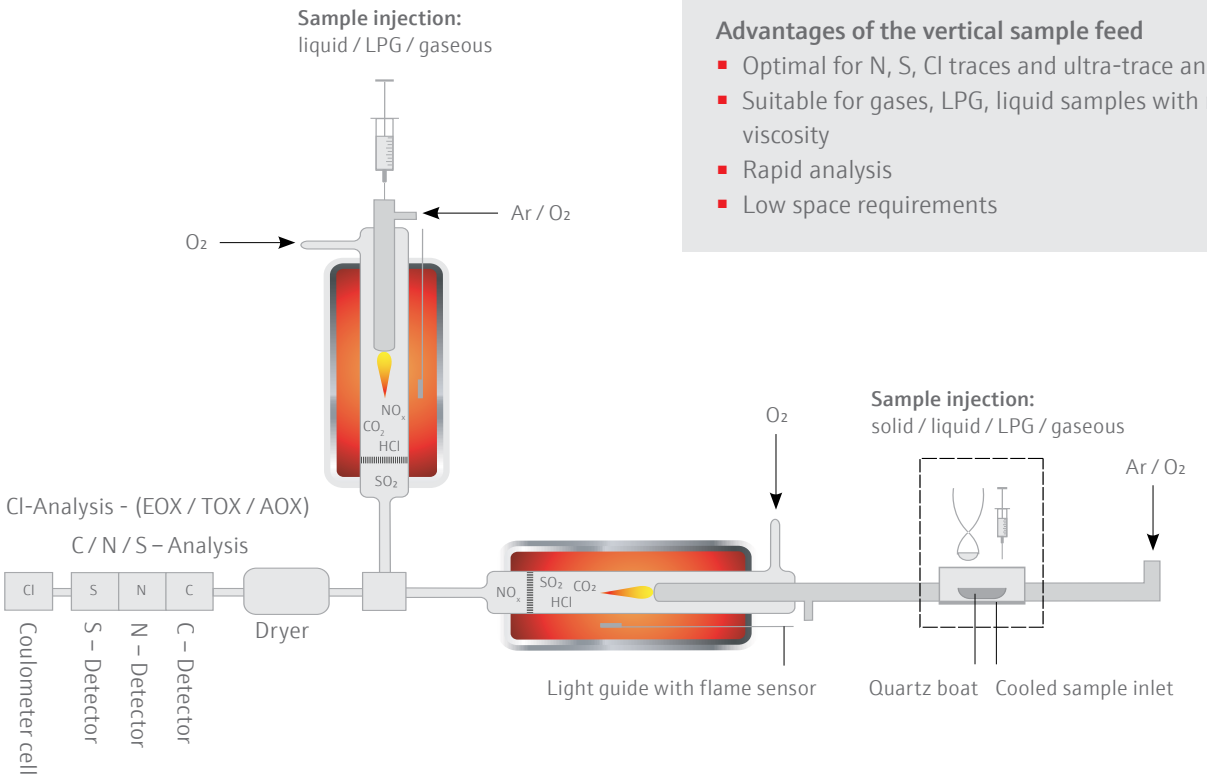
The multi EA® 5000 combines both modi in one and the same device. The furnace can be set up vertically or horizontally in next to no time and is thus automatically fixed for safe operation. The use of only one **multi-purpose combustion tube** for all standard applications, whether horizontal or vertical, makes conversion child's play. It is no longer necessary to change tubes.

Advantages of the horizontal sample feed

- Suitable for gases, LPG, solids
- Suitable for liquide samples regardless of their viscosity
- Optimal for very volatile liquids
- Optimal for the analysis of high element content
- Time and matrix-optimized combustion process
- Flame sensor technology prevents soot formation effectively

Advantages of the vertical sample feed

- Optimal for N, S, Cl traces and ultra-trace analysis
- Suitable for gases, LPG, liquid samples with normal viscosity
- Rapid analysis
- Low space requirements



In Future, We Will Perform Measurements More Quickly ... with Lower Operating Costs

One analyzer for identifying C, S, Cl and N, TOC, AOX / TOX, EOX in liquids, solids, gases and LPG matrices gives you the security of being able to meet the most varied of analytical challenges in next to no time with one single system.

Using **prefabricated method packages**, the multi EA® 5000 can be adapted to various measurement tasks very quickly. In addition, it allows you to adapt settings from the selected method to your particular application.

A **multi-matrix autosampler** for vertical and horizontal applications spares valuable working time – no need for laborious conversion, time-consuming connection work or adjusting an additional autosampler. The combustion system remains untouched. The amount of time saved when switching from liquid to solid samples or vice versa is without parallel.

The integrated **Self Check System (SCS)** ensures that the analysis process runs smoothly. It prevents faulty analyses and system contamination, thereby saving samples and working time. Thanks to selected, long-living materials, intelligent stand-by functions, the use of a multi-purpose combustion tube and a multi-matrix autosampler, the multi EA® 5000 cannot fail to impress with its low operating costs and incomparable performance.

Your Benefits

- Prefabricated methods, no development time required
- Guaranteed quantitative sample decomposition
- Improved precision thanks to optimum sample feed with autosampler – accelerated analysis cycle
- Very rapid analyses thanks to selection of the optimum operating mode

In Future, We Will See Perfect Results … Thanks to Intelligent Technologies

The ingenious combination of hardware components and software functions automatically ensures fault-free operation of the entire analysis system.

Self Check System

The Self Check System of the multi EA® 5000 checks all the parameters of importance for device safety and the quality of the analyses several times a second. There are sensors located at more than 20 places in the multi EA® 5000. These constantly check very important parameters such as gas flows, temperatures, pressure, system tightness, detector status, stability of the baselines, signal drift, cooling-off period, flame sensor value etc.. The result: An impressive performance and perfect readings. As an indispensable component for reliable work and safety, the SCS naturally belongs to the standard equipment that makes up the multi EA® 5000.

Your Benefits

- Maximum operating safety with minimum operating effort
- Very suitable for 24/7 operation, even with inexperienced operating personnel
- Automatic, time-saving detection and conditioning of available modules
- Automatic monitoring of maintenance intervals
- No soot formation due to fluctuations in gas flow or lack of gas
- Results are not too low due to gas leaks
- No outliers due to fluctuations in flow
- Automatic system deactivation in case of danger

Flame sensor technology

Complete combustion occurs by means of intelligent process guidance in which the sample is first pyrolyzed using inert gas. The pyrolysis products are then burned in the pure stream of oxygen. This is when the actual oxidation process takes place. The flame sensor monitors the flame which is formed – this is the key to complete oxidation, the prevention of soot formation and thus a guarantee for extremely accurate readings.

Your Benefits

- A single method for sample matrices with the same state of aggregation
- Matrix-dependent adjustment of process parameters is now redundant
- No prior knowledge of the combustion behavior of the samples required
- No time-consuming method development
- Uniquely high sample quantities
- A guaranteed quantitative sample decomposition, no more soot formation in systems
- Improved precision thanks to complete oxidation
- Minimized effects of sample matrix
- Clearly reduced maintenance effort

Self-learning function

The self-learning function is a systematic further development of the approved flame sensor technology in order to better optimize the combustion process especially for your sample matrix in terms of the time involved. This is the quickest, safest and, comparatively speaking, most complete combustion ever in the history of elemental analysis.

Flow Management System (FMS)

The FMS guarantees ultra-high operating safety and reliable analysis results. It ensures stable gas flows and that the system is free of gas leaks for complete combustion and accurate readings.

The high-performance gas box regulates and monitors the system gas flows electronically several times a second. If necessary, it allows the operator to adjust the gas flows and ensures extraordinary flexibility.

Checking that the system is free of gas leaks occurs continuously and fully automatically. The results are sent to the SCS. If the results differ from stored check values, the system automatically issues a warning to the operator. At the same time, all active device functions are blocked in order to prevent damage to the analysis system.

Your Benefits

- Maximum operating safety
- Guaranteed quantitative sample decomposition
- Reliable results
- Flexibility thanks to application-based adjustment of the gas flows
- Reduced maintenance effort

In Future, Accessories Will Be Detected … Just by Being There

An intelligent system automatically adjusts all settings.
All you have to do is press Start!

Plug-and-Start
The multi EA® 5000 is intelligent. After the analysis system has been started, it automatically checks its components and all functions. Suitable method packages are automatically loaded. The active configuration is identified for present sample introduction systems and automatically incorporated into the multiWin® software system settings.

Your Benefits
- Automatic detection of available modules makes the analysis more transparent
- Plug-and-Start technology saves time when installing new modules
- Automatic detection of the configuration of sample introduction systems eliminates sources of faults

Optional a manual, a semi-automatic, or a fully-automatic sample introduction system is available for the multi EA® 5000. This allows you to set up your multi EA® 5000 in accordance with your needs and requirements.

An autosampler for liquid or solid samples, vertical and horizontal applications

Liquid and solid samples can be dosed using the multi-matrix autosampler without requiring time-consuming conversion work. Horizontal sample feed via boats or vertical direct injection, two further functions within the same auto-sampler. The multi-matrix autosampler thus offers you four systems in one.

The various sampler heads, the type of sample rack and the size of the syringes are all detected by the SCS automatically. For the purpose of solids analysis, the autosampler can be equipped optionally with a boat sensor which checks that the boats used are positioned correctly.

Automation of the multi EA® 5000 gives you a higher sample throughput for solids and liquids than has ever been reached before, both in vertical and horizontal operation.

Your Benefits

- Easy to install and minimized adjustment effort
- Rapid changing of operating modes
- Automatic detection of the configuration
- Multi-matrix operation, suitable for solids, liquids and AOX / EOX samples
- Fully-automatic control system to ensure easy operation

Automatic injection, even without autosampler

An optional automatic injector is available for the injection of liquids. It can be used both for vertical and horizontal operation modes. Standardized filling volumes by means of one-step filling eliminate subjective faults being made by different operators. The injection speed is controlled by the multiWin® software. You dose samples as accurately as an autosampler.

One particular highlight is the unparalleled ease of the connection technology. By means of magnetic coupling, the autoinjector is quickly and easily attached to the combustion module and held safely in the correct position.

Your Benefits

- Easy to install and no need to make adjustments thanks to magnetic coupling
- Automatic detection of the dosing volume
- Extremely accurate thanks to standardized filling
- Constant dosing speed thanks to multiWin® control system
- Reliable dosing

In Future, We Will Work Flexibly … with Only One Apparatus

An unparalleled detector versatility opens up a broad application range. You can combine various detection systems together as you require in order to tailor your own personal system for elemental analysis.

Sulfur, nitrogen, carbon and chlorine analysis without hardware changes

The sulfur, nitrogen and carbon analysis is performed simultaneously and highly sensitively. Afterwards the chlorine content is automatically measured. This is the first time that all four elements can be automatically identified in one single analysis cycle. The apparatus does not have to be converted for this purpose.

A highly-sensitive UV fluorescence detector or a robust micro-coulometric titrator are available for sulfur analysis. You can analyze nitrogen using a powerful chemiluminescence detector. The maintenance-free NDIR detector allows the carbon to be analyzed. Chlorine, TOX / AOX and EOX contents are analyzed using the micro-coulometry principle. This covers a broad measuring range of wt-% stretching as far as the lowest ppb range for the elements under examination.

Chlorine analysis made easy

Chlorine measurements are highly dependent on the stability of the coulometer. In order to avoid faulty analyses, the multi EA® 5000 works with electronically stabilized, cooled micro-coulometric cells. Software functions such as automatic conditioning, drift monitoring and the auto zero function before every start of analysis guarantee unparalleled stability and sensitivity. In this way, chlorine can be easily detected in the lowest ppb ranges during routine operation.

Simple, automated analysis of environmental parameters

Using the multi EA® 5000, you can also analyze environmental parameters such as AOX / TOX, EOX or EC / OC and TOC. The universal multi-matrix autosampler automates the EOX and AOX / TOX analysis in accordance with both the column method and the batch method. For the TOC analysis, the sample is dosed directly into the combustion tube with the same autosampler or manually.

The multi EA® 5000 – operates at full power, even under pressure

The automated analysis of gaseous matrices such as natural gas or calibration gas mixtures as well as liquefied pressurized gases (LPG) is performed using a revolutionary dosing technique which is extremely precise and sensitive. The freedom to select any dosing volume at all not only allows the duration of the analysis process to be reduced but also allows a wide concentration range to be calibrated with only one gas standard.

Highly-sensitive gas analyses

Special modules for analyzing gaseous and LPG samples are available. These are optimized for the tasks in question. They combine extremely high ease of operation and ultra-modern gas handling technologies with maximum safety for the user.

Your Benefits

- Simple and safe connection technology for sample containers
- Fully-automatic module control
- Automatic rinsing steps to clean the dosing system
- Perma-purge technology eliminates memory effects
- Uniquely high, variable dosing volume of up to 100 ml
- Gas analyses of unrivaled sensitivity in the trace range

Liquid gas (LPG) analyses, even at low sample pressure

The LPG module, which is fitted with a special dosing valve featuring a Peltier cooling system, is used for the dosing of liquefied gases. This allows too early expansion of the sample and the associated formation of bubbles to be prevented effectively. Extremely accurate, correct readings are now standard in daily work.
A further advantage is the clear reduction in the required initial pressure of the sample in comparison with conventional LPG systems. No longer it is necessary to apply auxiliary gas to increase the pressure in the sample container. This makes it possible to work efficiently and provides protection against contamination.

The liquefied gas is evaporated in a heated chamber after the sample has been taken. This guarantees that even low volatile components enter a gaseous state completely. Memory effects no longer occur. The transfer of the sample into the combustion system is also supported by a permanent flow of purge gas known as perma-purge.

Your Benefits

- Simple and safe connection technology for sample containers
- Meets very high safety standards
- No auxiliary gases required to raise the pressure, reduces operating costs
- Peltier cooling to ensure extremely accurate dosing
- Uniquely high, variable dosing volume of up to 50 µl
- Heated evaporation chamber for quantitative sample evaporation
- Perma-purge technology eliminates memory effects
- LPG analyses of unrivaled sensitivity in the trace range

In Future, We Will Use High-Performance Technologies ... Even Without Being Specialists

With user-friendly concepts and the simplest possible operation the application of a high-performance analyzer is mere child's play.

The intuitive user guide of the multi EA® 5000 and a multitude of helpful functions are available to support you at all times. Thanks to intelligent detail solutions, maintenance and system care are simpler and quicker than ever before. The multi EA® 5000 is not only the universal talent in elemental analysis but also particularly suitable for routine applications in daily practice.

Intuitive user guidanance – unique in elemental analysis

The modern multiWin® software provides a library with common standard methods for routine analysis, fully ASTM compliant method packages, and selected special applications.

The self-explanatory multiWin® software accompanies you from system start through all relevant menu points until the analysis system is switched off at the end of the working day. The result is software that is your personal assistant and consultant. Even members of staff without specialist knowledge succeed easily and quickly.

The software monitors and regulates all important system parameters. It immediately points out errors in the configuration of the system and detects the input of unsuitable parameters, thus avoiding unusable results from the very beginning. It checks the system's performance and the quality of analysis. It presents the results clearly in individual analysis reports. And much more.

Self Check System (SCS)

The SCS guarantees uninterrupted and fully automatic operation of the multi EA® 5000. It checks and monitors all relevant parameters which influence the results as well as the security of the instrument and its operation.

FAST connection technique

An innovative tube connection technique guarantees that the analysis system is free of gas leaks. You'll never again need to waste time looking for gas leaks, never again be confronted with results that are too low. During installation, the combustion tube is simply inserted into the furnace, the rest is carried out by the multi EA® 5000 itself, no tools are necessary. Connection of the system gases is also quick thanks to flexible temperature-resistant materials.

Auto-protection

The first fully integrated particle filter to protect the whole analysis system increases operating safety and minimizes maintenance effort. It provides effective protection against damage and contamination for all components in the analysis system.

Your Benefits

- Intuitive user guidance
- Automatic regulation and monitoring of all system parameters
- Clear presentation of the results
- Extensive method library for standard applications
- Including package of fully ASTM compliant analysis methods

In Future, We Will Analyze ... like We've Never Done before

With the technology of tomorrow and unmatched variability and flexibility, the multi EA® 5000 offers customized elemental analysis and optimum precision. Many analyzers in one – one analyzer for you. The multi EA® 5000.

With your multi EA® 5000, you can analyze the entire range of liquid sample matrices, regardless of chemical composition, element content, oxidative characteristics, boiling point or other substance properties.

The quantitative digestion of solids, such as wax, polymers, wood and even coal is carried out using unique flame sensor technology with matrix and time optimization. Prior knowledge of combustion characteristics of the samples, time-consuming setting of methods or optimization of process parameters are a matter of the past.

Petrochemical industry
- Analysis of aromatic and aliphatic hydrocarbons, lubricants, transmission oil, transformer oil, brake and hydraulic fluids and much more

Mineral oil and natural gas production, refineries
- Analysis of mineral oil, natural gas, fuel fractions, distillation residues, fuel additives, biodiesel, bioethanol and much more

Chemical industry
- Analysis of waxes, fatty acids, dyes, solvents such as hydrocarbons, alcohols, aldehydes, ketones etc.

Polymer industry
- Analysis of raw materials such as butane, propane, additives and derivatives like PP, PE, PC, and caoutchouc

Pharmacy
- Analysis of white oil, vaseline, waxes, paraffins, activated carbon, alcohols and other organic compounds

Food industry
- Analysis of alcohols, fats, oils, waxes and much more

Environmental analysis
- Determination of TOC, TOX / AOX / EOX in surface, cooling, process and waste waters
- TOX / AOX / EOX in soil, sewage sludge and sediments
- EC / OC for particulate diesel engine emissions for monitoring air quality

Power stations
- Analysis of fuels such as coal, fuel oil, natural gas, derived fuels such as wood, straw etc.
- TOC and TOX / AOX in cooling water

Material testing / quality control
- Analyses for certification of N, S and Cl standards, e.g. for the petrochemical industry
- Purity testing of solvents etc.

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